

## CLAIMS:

1. A method of generating a sequence of waveforms, the waveforms being generated at timings corresponding to symbols in a primary sequence having a narrow autocorrelation function, wherein each waveform is randomly selected from  
5 a set of waveforms with respective predetermined characteristics.
2. A method as claimed in claim 1, wherein the primary symbol sequence corresponds to a train of discrete pulses separated by gaps.
- 10 3. A method as claimed in claim 2, wherein the pulses are arranged in packets of predetermined configuration.
4. A method as claimed in claim 3, wherein the minimum gap between adjacent pulses in a packet exceeds a predetermined value, whereby the  
15 autocorrelation sequence of the packet exhibits a zero value for consecutive relative shifts which do not exceed a predetermined limit.
5. A method as claimed in any preceding claim, in which the waveforms of said set are substantially mutually orthogonal.  
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6. A method as claimed in any preceding claim, wherein the waveforms have respective different frequencies.
7. A method as claimed in any preceding claim, in which the primary  
25 symbol sequence include symbols of a plurality of types, and in which each waveform is selected from one of a plurality of waveform sets, each set corresponding to a respective symbol type.
8. A method as claimed in any preceding claim, in which the primary  
30 symbol sequence comprises a first pulse sequence interleaved with a second pulse

sequence which is a time-reversed replica of the first pulse sequence, at least a substantial number of the waveforms corresponding to each pulse sequence being distinguishable from those corresponding to the other pulse sequence.

5           9.       A method of detecting an object, the method comprising transmitting a sequence of waveforms generated using a method as claimed in any preceding claim, receiving reflections of the transmitted waveforms and determining matches between the transmitted and received waveforms.

10           10.       A method as claimed in claim 9, wherein the transmitted waveforms are selected from sets each corresponding to a respective symbol type in the primary symbol sequence, the method including decoding the received waveforms to obtain a received symbol sequence and cross-correlating the primary symbol sequence with the received symbol sequence to determine matches between the transmitted and  
15   received waveforms.

          11.       A method as claimed in claim 9 or claim 10, including the step of storing data indicating which waveforms have been randomly selected, and using the stored data to determine matches between the transmitted and received  
20   waveforms.

          12.       Apparatus for generating a sequence of waveforms, the apparatus being arranged to operate in accordance with a method as claimed in any one of claims 1 to 8.

25           13.       Obstacle-detection apparatus for use in a multi-user environment, the apparatus being arranged to operate in accordance with a method as claimed in any one of claims 9 to 11.

14. Obstacle-detection apparatus as claimed in claim 13, including means for providing a signal indicative of the range of a detected object.

15. Obstacle-detection apparatus as claimed in claim 13 or claim 14 for  
5 use in a vehicle or vessel to detect potential collisions.

16. A collision-warning system for a vehicle or vessel, the system comprising an obstacle-detection apparatus as claimed in claim 15 and means for generating a warning signal in response to obstacle-detection.  
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17. A ranging aid for a vehicle or vessel, the system comprising an obstacle-detection apparatus as claimed in claim 15 and means for generating a signal indicative of the range of a detected obstacle.